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PASSIVE THERMOSTABILIZATION OF MEDICAL THERMOGRAPHY CAMERA OPTICAL SYSTEM

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Medical heat vision is a contactless, rapid and non-invasive means of diagnosis for many known diseases. The method allows to observe in dynamic and control the effectiveness of treatment, healing of wounds at different stages of morphogenesis and also prevent the possible development of complications. Thermograph using is a highly effective and informative means of patients screening for the detection of inflammatory processes in the early disease stages. To date, the criteria of thermal imaging diagnostics for more than two hundred diseases and pathological conditions are developed and this list is constantly being replenished.

At analyzing thermogram information and setting the diagnosis, there are certain rules and regularities. For example, registered temperature difference of 1-2°C on oppositely symmetrical body parts indicates presence of the organism pathology. In particular, at tumors the temperature change to greater side indicates malignant degeneration and to lesser side indicates benign nature of the tumor.

Temperature fluctuations of the environment during the infrared technique operation significantly affect to its characteristics, such as quality and informativeness of the thermogram, so at the design stage of such high-precision and sensitive devices it is expediently to carry out an athermalization of the optical system. In the process of dioptric objectives synthesizing, which include several components, it is possible to select materials for the purpose of system self-athermalization, simultaneously to perform the achromaticization of the optical system and to minimize those image aberrations, on which highest requirements are subjected. To perform above tasks, such as thermostabilization and characteristics improvement of the thermograph objectives, at calculating stage of the optical system parameters of the infrared device it is advisable to use passive optical athermalization method. The method algorithm involves the using at the lenses design several infrared materials with different magnitudes and signs of thermo-optical constants in combination with certain material of supporting structure.

Synthesized on base of passive optical athermalization infrared objectives with thermostabilized value of back focal length of the optical system maintain the stability of frequency and energy characteristics and keep high image quality in the operating temperatures range.

Keywords: athermalization, medical thermograph, optical system.

References

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